Class Exercise #21
1.050 Solid Mechanics   Fall 2004

Develop a quadratic equation for the location of the neutral axis of the composite beam, h/H_s, in terms of the geometric parameters shown from the requirement that the resultant force in the x direction must be zero. ie. $\int_{A_c} \sigma_c dA_c + \int_{A_s} \sigma_s dA_s = 0$ and assuming continuity of displacement across the interface so

that the strain distribution is a continuous, linear function of the distance from the neutral axis, $\varepsilon_x = -\frac{y}{\rho}$.

The concrete is shown as shaded.

Take the ratio of the Young moduli of the steel to concrete as 10.